

## NORTH PACIFIC OCEAN

By WILLIS E. HURD

Early in October the Aleutian cyclone took on a real winter phase of development, covering the Gulf of Alaska and extending far southward along the coast, giving lowest pressures for the month at coast stations from Juneau to Tatoosh Island. It was followed over Alaska by a strong anticyclone, upon the passage of which cyclonic conditions became reestablished, dominating the weather thenceforth to the end of October over much of the northeastern part of the ocean. From the 20th to the 24th the cyclone intensified greatly, the barometer falling to 28.18 at Kodiak on the 20th. On the 31st the center of the disturbance lay south of the Gulf of Alaska, probably near 50° N., 147° W., where the lowest reported pressure reading of the month, 28.09 inches, occurred.

Consequent upon the far-reaching incursions of the cyclone, the Pacific-California anticyclone underwent a period of considerable instability, fluctuating back and forth, and frequently dividing and diminishing in area.

Pressure data for several island and coast stations in west longitudes are contained in the following table:

TABLE 1.—Averages, departures, and extremes of atmospheric pressure at sea level at indicated hours, North Pacific Ocean, October, 1928

Stations	Average pressure	Departure from normal	Highest	Date	Lowest	Date
	Inches	Inch	Inches		Inches	
Dutch Harbor <sup>1</sup>	29.53	-0.16	30.38	1st	28.56	20th.
St. Paul <sup>1</sup>	29.57	-0.09	30.40	9th	28.46	24th.
Kodiak <sup>1</sup>	29.51	-0.08	30.26	10th	28.18	20th.
Midway Island <sup>1</sup>	30.06	+0.01	30.20	29th	29.80	9th.
Honolulu <sup>2</sup>	30.00	0.00	30.10	2d	29.87	9th.
Juneau <sup>1</sup>	29.82	-0.05	30.53	10th	29.00	6th.
Tatoosh Island <sup>2,3</sup>	30.03	0.00	30.32	11th	29.24	3d.
San Francisco <sup>2,3</sup>	30.02	+0.02	30.21	14th	29.58	11th.
San Diego <sup>2,3</sup>	29.95	+0.02	30.15	14th	29.57	11th.

<sup>1</sup> P. m. observations only.

<sup>2</sup> A. m. and p. m. observations.

<sup>3</sup> Corrected to 24-hour mean.

October was the stormiest month since February, 1928, along the upper steamship routes. Whole storm to hurricane wind velocities are reported to have occurred near the fiftieth parallel, between 140° and 175° west longitudes on the 9th, 16th, 20th, and 31st, and whole gales on other dates in northern waters east and west of the one hundred and eightieth meridian. Gales of force 11 also occurred considerably to the southward of the fiftieth parallel near midocean on the 8th and 31st. All these gales but one were attributable directly to the activities of the Aleutian cyclone. That of the 8th, near 36° N., 170° W., was due to a storm that was first observed that same morning east of Midway Island. The storm area had spread north to the Aleutians late on the 9th, and by the 11th, with apparently lessened energy, lay over the eastern part of Bering Sea, whence it crossed Alaska to northwestern Canada.

The region of most frequent storminess was immediately south of the central Aleutians, between 180° and 170° W., where gales of force 8 and upward occurred on 20 to 25 per cent of the days. Fresh gales blew off the California coast on the 11th and 12th, and moderate northers occurred in the Gulf of Tehuantepec on several of the last days of the month.

At least three tropical cyclones of considerable severity formed this month as described by Rev. José Coronas, S. J., of the Philippine weather bureau, in the subjoined article. One of the United States Weather Bureau's reporting vessels, the American steamer *Golden Sun*, passed through the northern edge of the second typhoon on the 6th, near 39° N., 150° E., encountering a gale of force 11, NNE., at a considerable distance from the storm center. Beside the three enumerated, a fourth typhoon, that of the 17th to 19th, is shown on the Tokyo weather charts as coming up from the south of Japan. It passed off the southeastern coast of Honshu late on the 18th, going northeastward. The American steamer *Astral* was caught in this cyclone near 34° N., 150° E., on the 18th, but upon receipt of typhoon warnings broadcast from the Chosi radio station, she changed her course and evaded the storm center toward which she had earlier been steering, thus escaping with only a whole gale.

Two tropical cyclones occurred in Mexican waters, thus increasing the known number for 1928 to nine. Of the earlier there is record for the 7th, furnished by Capt. Philip G. Beck, master of the American steamer *Santa Veronica*, Balboa to Hilo, which encountered fresh to whole south to southwest gales from 6 a. m. until midnight, between latitudes 15° 15' and 16° N., longitudes 109° and 112° 30' W. The following is quoted from a report of Captain Beck to the Hydrographic Office:

On the morning of the 7th at 6 o'clock the storm broke \* \* \*. Through radio communication with the master of the American steamer *Invincible*, he reports at 8 p. m., October 7, barometer 29.60 wind SSW., hurricane force, and a heavy SW. sea, and at 11 p. m., same date, barometer 29.78, wind and sea moderating. This showed that the storm was moving northwest, as the *Invincible* was about 100 miles west by north of the *Santa Veronica* \* \* \*. All indications seemed to show storm moving northwest ahead of the ship and at about 10 miles per hour.

The second cyclone was encountered by the British steamer *Lowther Castle*, Panama to Honolulu, during the 15th and 16th, and slightly to the westward of the *Invincible's* storm. Moderate to fresh gales only were experienced, these occurring between 8 p. m. and 4 a. m., blowing from southerly and finally from northeasterly directions, lowest pressure 29.48 inches, at 2 a. m., in 16° 34' N., 113° 29' W.

Easterly trades prevailed at Honolulu in October, except on the last three days, when moderate konas occurred. The maximum velocity was 24 miles from the east on the 4th.

Fog decreased greatly in northern waters since September, being reported on not more than four days in any 5-degree square, except along the American coast, where it occurred on approximately 25 per cent of the days off Washington, and on 40 to 45 per cent off central California.

**Waterspout.**—Reported by Mr. J. G. Hill, second officer and observer of the British steamer *Bolton Castle*, Honolulu toward Manila:

On October 11, at 3 p. m. a waterspout was observed about a mile to starboard of the ship, latitude 12° 48' N., longitude 122° 56' E. The spout rose to a height of approximately 200 feet, entering dense nimbus cloud, and gradually narrowed to a column seemingly not more than 10 feet in diameter; blue-gray in color and twisted toward its upper end. At the base of the spout spray rose to the height of 20 feet. No horizontal motion was evident. The spout was visible for fully three minutes, and was then overtaken by a rain squall, which approached from northward. Then followed half an hour torrential rain, with thunder at times, at the end of which no trace of spout was visible \* \* \*. Barometer remained steady throughout at 29.80, corrected, wind N. by E.